

What is claimed is:

1. A display device having a level converting circuit including thin film transistors formed on a substrate, wherein
5 the level converting circuit converts non-differential input signals having an amplitude of 1.2V or less into signals having a larger amplitude.
2. A display device according to claim 1, wherein the input signals are signals which have an amplitude smaller than a twofold
10 value of a threshold voltage of the thin film transistors.
3. A display device according to claim 2, wherein the input signals are signals which have an amplitude equal to or less than 1.6 times of a threshold voltage of the thin film transistors.
4. A display device according to claim 2, wherein the input
15 signals are signals which have an amplitude equal to or more than a threshold voltage of the thin film transistors and equal to or less than 1.6 times of a threshold voltage of the thin film transistors.
5. A display device according to claim 1, wherein the input
20 signals are either control signals or display data.
6. A display device according to claim 1, wherein the input signals are control signals, and
the level converting circuit includes:
a first-conductive-type first transistor which is
25 connected between a first power source line to which a first

voltage is supplied and an output terminal and has a gate electrode to which the input signals are applied through a first capacitive element;

a second-conductive-type second transistor which is
5 connected between the output terminal and a second power source line to which a second voltage is supplied and has a gate electrode to which the input signals are applied through a second capacitive element;

a first bias circuit which applies a first bias voltage
10 to the gate electrode of the first transistor; and

a second bias circuit which applies a second bias voltage to the gate electrode of the second transistor, wherein

the first bias voltage is a voltage which turns off the first transistor when a voltage applied to the gate electrode
15 of the first transistor assumes a maximum value, and

the second bias voltage is a voltage which turns off the second transistor when a voltage applied to the gate electrode of the second transistor assumes a minimum value.

7. A display device according to claim 6, wherein the first
20 bias voltage is a voltage which allows a maximum value of a voltage applied to the gate electrode of the first transistor to assume a voltage value which is obtained by subtracting a threshold voltage of the first transistor from the first voltage, and
the second bias voltage is a voltage which allows a minimum
25 value of a voltage applied to the gate electrode of the second

transistor to assume a voltage value which is obtained by adding a threshold voltage of the second transistor to the second voltage.

8. A display device according to claim 1, wherein the input
5 signals are display data, and the level converting circuit includes:

a sample holding circuit which performs sampling of the input signals;

10 a transistor having a gate electrode to which an output voltage of the sample holding circuit is applied;

a first switching element having a first electrode which is connected to a first power source line to which a first voltage is supplied;

15 a second switching element having a second electrode which is connected to a second electrode of the first switching element and a first electrode which is connected to the second electrode of the transistor;

a voltage holding circuit being connected to a second electrode of the second switching element;

20 an inverter circuit being connected between the first power source line and a second power source line to which a second voltage is supplied, an output voltage of the voltage holding circuit being inputted to the inverter circuit; and

25 a bias circuit applying a bias voltage to a first electrode of the transistor, wherein the bias voltage is a voltage which

turns off the transistor when a voltage applied to a gate electrode of the transistor assumes a minimum value.

9. A display device according to claim 8, wherein the bias voltage is a voltage obtained by subtracting a threshold voltage 5 of the transistor from the second voltage.

10. A display device including a first level converting circuit which converts control signals having a small amplitude into signals having a larger amplitude, and

10 a second level converting circuit which converts display data having a small amplitude to signals having a larger amplitude, wherein

the first level converting circuit includes:

15 a first-conductive-type first transistor which is connected between a first power source line to which a first voltage is supplied and an output terminal and has a gate electrode to which the control signals are applied through a first capacitive element;

20 a second-conductive-type second transistor which is connected between the output terminal and a second power source line to which a second voltage is supplied and has a gate electrode to which control signals are applied through a second capacitive element;

a first bias circuit which applies a first bias voltage to the gate electrode of the first transistor; and

25 a second bias circuit which applies a second bias voltage

to the gate electrode of the second transistor, wherein
the first bias voltage is a voltage which turns off the
first transistor when a voltage applied to the gate electrode
of the first transistor assumes a maximum value, and
5 the second bias voltage is a voltage which turns off the
second transistor when a voltage applied to the gate electrode
of the second transistor assumes a minimum value, and
 the second level converting circuit includes:
 a sample holding circuit which performs sampling of the
10 display data;
 a third transistor having a gate electrode to which an
output voltage of the sample holding circuit is applied;
 a first switching element having a first electrode which
is connected to the first power source line;
15 a second switching element having a second electrode which
is connected to a second electrode of the first switching element
and a first electrode which is connected to a second electrode
of the third transistor;
 a voltage holding circuit being connected to a second
20 electrode of the second switching element;
 an inverter circuit being connected between the first power
source line and the second power source line, wherein an output
voltage of the voltage holding circuit is inputted to the inverter
circuit; and
25 a third bias circuit applying a third bias voltage to a

first electrode of the third transistor, wherein the third bias voltage is a voltage which turns off the third transistor when a voltage applied to a gate electrode of the third transistor assumes a minimum value.

5 11. A display device according to claim 10, wherein the first bias voltage is a voltage which allows a maximum value of a voltage applied to a gate electrode of the first transistor to assume a voltage value which is obtained by subtracting a threshold voltage of the first transistor from the first voltage,

10 and

the second bias voltage is a voltage which allows a minimum value of a voltage applied to a gate electrode of the second transistor to assume a voltage value which is obtained by adding a threshold voltage of the second transistor to the second voltage,

15 and

the third bias voltage is a voltage obtained by subtracting threshold voltage of the third transistor from the second voltage.

12. A display device according to claim 10, wherein in
20 response to control signals outputted from the first level converting circuit, the first switching element and the second switching element of the second level converting circuit are driven.

13. A display device according to claim 10, wherein the
25 first level converting circuit and the second level converting

circuit include thin film transistors formed on a substrate.

14. A display device including a level converting circuit which converts input signals having a small amplitude into signals having a larger amplitude, wherein

5 the level converting circuit includes:

a first-conductive-type first transistor which is connected between a first power source line to which a first voltage is supplied and an output terminal and has a gate electrode to which the input signals are applied through a first capacitive element;

a second-conductive-type second transistor which is connected between the output terminal and a second power source line to which a second voltage is supplied and has a gate electrode to which the input signals are applied through a second capacitive element;

a first bias circuit which applies a first bias voltage to the gate electrode of the first transistor; and

a second bias circuit which applies a second bias voltage to the gate electrode of the second transistor, wherein

20 the first bias voltage is a voltage which turns off the first transistor when a voltage applied to the gate electrode of the first transistor assumes a maximum value, and

the second bias voltage is a voltage which turns off the second transistor when a voltage applied to the gate electrode of the second transistor assumes a minimum value.

15. A display device according to claim 14, wherein the first bias voltage is a voltage which allows a maximum value of a voltage applied to the gate electrode of the first transistor to assume a voltage value which is obtained by subtracting a 5 threshold voltage of the first transistor from the first voltage, and

the second bias voltage is a voltage which allows a minimum value of a voltage applied to the gate electrode of the second transistor to assume a voltage value which is obtained by adding 10 a threshold voltage of the second transistor to the second voltage.

16. A display device including a level converting circuit which converts input signals having a small amplitude into signals having a larger amplitude, wherein the level converting 15 circuits includes:

a sample holding circuit which performs sampling of the input signals;

a transistor having a gate electrode to which an output voltage of the sample holding circuit is applied;

20 a first switching element having a first electrode which is connected to a first power source line to which a first voltage is supplied;

a second switching element having a second electrode which is connected to a second electrode of the first switching element 25 and a first electrode which is connected to a second electrode

of the transistor;

a voltage holding circuit being connected to a second electrode of the second switching element;

an inverter circuit being connected between the first power source line and a second power source line to which a second voltage is supplied, an output voltage of the voltage holding circuit being inputted to the inverter circuit; and

a bias circuit applying a bias voltage to a first electrode of the transistor, wherein the bias voltage is a voltage which turns off the transistor when a voltage applied to a gate electrode of the transistor assumes a minimum value.

17. A display device according to claim 16, wherein the bias voltage is a voltage obtained by subtracting a threshold voltage of the transistor from the second voltage.

18. A display device according to claim 14, wherein the level converting circuit includes thin film transistors formed on a substrate.

19. A display device according to claim 16, wherein the level converting circuit includes thin film transistors formed on a substrate.